

EAST - [bartz.wsp:1]

File View Edit Tools Window Help

Drafts  
BRS:  
Pending  
Active  
L1: (1) 4733876.pn.  
L2: (1) 5566971.pn.  
L3: (554) Nelson,ss.  
L4: (2376) Hadley  
L5: (1) 3 AND 4  
Failed  
Saved  
Favorites  
Tagged (0)

Search [Go] Browse Queue Clear  
DB: USPAT-US-PGPR  
Default operator: OR  
Highlight all hit terms initially

3 AND 4  
09/939,363

BRS turn ISAR turn Image Text HTML

	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Retrieval Class	Inventor	S	C	P
1	<input type="checkbox"/>	<input type="checkbox"/>	US 5161579 A	19921110	17	Leveling valve for air springs	137/627.5	251/80; 267/64.18;		Anderson, Jr., Henry M.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EAST SEARCH  
9/30/02

Ready NUM

EAST - [Untitled1:1]

FileViewEditToolsWindowHelp

Drafts

Pending

Active

Failed

Saved

Favorites

Search

Go

Browse

Queue

Clear

DB: USPAT:US-PG-PUB

Default operator: DR

5161575.uref.

BRS form

SAR form

Image

Text

HTML

U

1

Document ID

Issue Date

Pages

Title

Current OR

Current XRef

Retrieval Cls

Inventor

S

C

P

1

☐

☒

US 6412750 B2

20020702

10

Vehicle suspension and rotary height control valve for same

280/6.159

137/625.22;  
280/124.16

McKenzie, Thomas A. et al.

☒

☐

☐

2

☐

☒

US 6089551 A

20000718

22

Height control valve with integral dump device

267/64.16

267/DIG.1;  
280/6.157

Haviland, Robin Lee et al.

☒

☐

☐

3

☐

☐

US 5860450 A

19990119

16

Height control valve for vehicle leveling system

137/627.5

280/124.16

Trudeau, Curtis A. et al.

☒

☐

☐

4

☐

☒

US 5787932 A

19980804

21

Bypass tube for time delay height control valve

137/627.5

137/636.1;  
251/54;

Pieroe, William C.

☒

☐

☐

5

☐

☐

US 5682922 A

19971104

20

Dual in-line height control valve assembly

137/627.5

137/636.1;  
251/54;

Gatazin, Gregory T. et al.

☒

☐

☐

6

☐

☐

US 5560591 A

19961001

16

Leveling valve for air springs

267/64.16

137/627.5;  
251/80

Trudeau, Curtis A. et al.

☒

☐

☐

7

☐

☐

US 5375816 A

19941227

12

Dual in-line height control valve assembly

267/64.16

137/627.5;  
137/636.1;

Gatazin, Gregory T. et al.

☒

☐

☐

8

☒

☐

US 5335695 A

19940809

12

Height control valve with adjustable spool

137/627.5

280/6.157;  
51/390

Pieroe, William C.

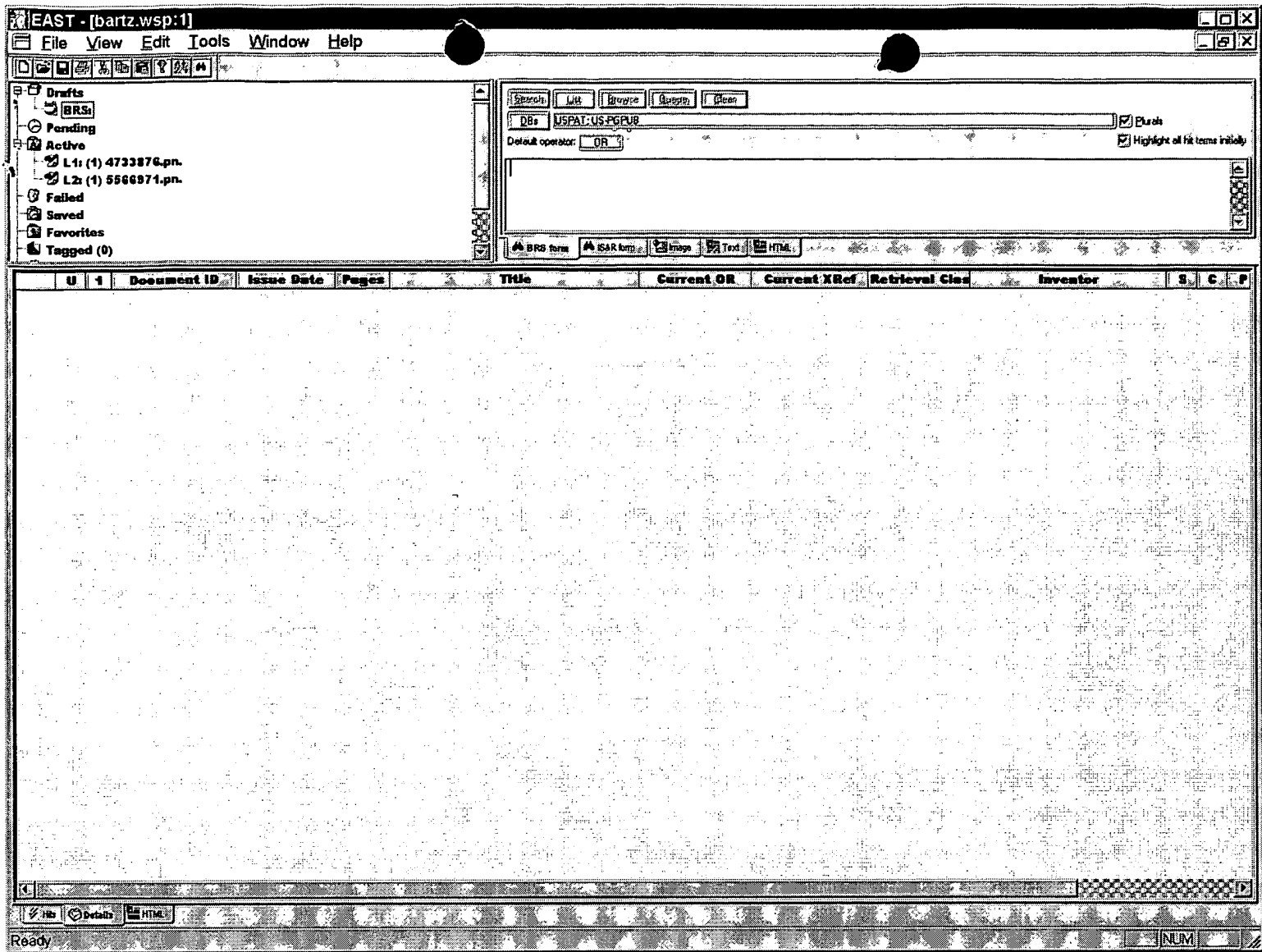
☐

☐

☐

Ready

NUM



US-PAT-NO: 4733876  
DOCUMENT-IDENTIFIER: US 4733876 A  
TITLE: Suspension and leveling system for a vehicle  
DATE-ISSUED: March 29, 1988

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Heider, Merte J.	Humboldt	IA	50548	N/A
Heider, Dale J.	Humboldt	IA	50548	N/A
Heider, Leon J.	Humboldt	IA	50548	N/A

APPL-NO: 06/942606  
DATE FILED: December 17, 1986

INT-CL: [04] B60G017/04  
US-CL-ISSUED: 280/6H, 280/712, 280/DIG.1  
US-CL-CURRENT: 280/6.158, 280/124.116, 280/124.163, 280/6.153, 280/DIG.1  
FIELD-OF-SEARCH: 280/6R; 280/6H; 280/DIG.1; 280/712; 280/713

## REF-CITED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
2949316	August 1960	Davies et al.	280/DIG.1 N/A N/A
3181877	May 1965	McHenry	280/DIG.1 N/A N/A
3784221	January 1974	Fraser, Sr.	280/712 N/A N/A
3836161	September 1974	Buhl	280/6H N/A N/A
3917307	November 1975	Shoebridge	280/6H N/A N/A
4580798	April 1986	Roelofs	280/6R N/A N/A
4580809	April 1986	Leaf	280/712 N/A N/A
4641843	February 1987	Morrisroe, Jr.	280/6R N/A N/A

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
2141677	January 1985	GB	280/712

ART-UNIT: 316  
PRIMARY-EXAMINER: Weaver, Ross

## ABSTRACT:

The suspension system of the present invention includes an elongated spring having one end attached to the vehicle frame and having a second end. A pneumatic bag includes an upper end which is attached to the vehicle frame and a lower end. A securing bracket attaches the lower end of the bag and the second end of the elongated spring to the axle so that the weight of the vehicle frame above the axle is supported in combination by the spring and the air bag. A pneumatic control system is in communication with the bag for selectively introducing air to the bag so as to control the pressure within the bag and thereby control the height that the bag supports the vehicle frame above the

## United States Patent (19)

Heider et al.

[11] Patent Number: 4,733,876

[45] Date of Patent: Mar. 29, 1988

## [54] SUSPENSION AND LEVELING SYSTEM FOR A VEHICLE

[76] Inventors: Merte J. Heider, 203-12th St., SW,  
Dale J. Heider, 1108-8th Ave., SW,  
Leon J. Heider, R.R., all of,  
Humboldt, Iowa 50548

[21] Appl. No. 942,606

[22] Filed: Dec. 17, 1986

[31] Int. Cl. B60G 17/04

[32] U.S. Cl. 280/6 H; 280/712; 280/DIG. 1

[52] Field of Search 280/6 R, 6 H, DIG. 1, 280/712, 713

## References Cited

## U.S. PATENT DOCUMENTS

3,949,316	1/1960	Davies et al.	280/DIG. 1
3,181,877	5/1965	McHenry	280/DIG. 1
3,784,221	1/1974	Fraser, Sr.	280/712
3,836,161	9/1974	Buhl	280/6 H
3,917,307	11/1975	Shoebridge	280/6 H
4,580,798	4/1986	Roelofs	280/6 R
4,580,809	4/1986	Leaf	280/712
4,641,843	2/1987	Morrisroe, Jr.	280/6 R

## FOREIGN PATENT DOCUMENTS

2141677	1/1985	United Kingdom	280/712
---------	--------	----------------	---------

Primary Examiner—Ross Weaver

Attorney, Agent, or Firm—Zarley McKee, Thomas, Voorhees &amp; Sease

## [57] ABSTRACT

The suspension system of the present invention includes an elongated spring having one end attached to the vehicle frame and having a second end. A pneumatic bag includes an upper end which is attached to the vehicle frame and a lower end. A securing bracket attaches the lower end of the bag and the second end of the elongated spring to the axle so that the weight of the vehicle frame above the axle is supported in combination by the spring and the air bag. A pneumatic control system is in communication with the bag for selectively introducing air to the bag so as to control the pressure within the bag and thereby control the height that the bag supports the vehicle frame above the axle. A stabilizer bar is pivotally connected at one end to the vehicle frame and at the other end to the axle so as to cause the vehicle frame to be centered over the axle while at the same time permitting the vehicle frame to move vertically with respect to the axle. The control means includes both manual and automatic control valves for controlling the height of the frame above the axle. Electrical switches are connected to solenoids for controlling the valves so as to permit the raising and lowering of the vehicle frame with respect to the axle.

10 Claims, 8 Drawing Figures

